Figure 1

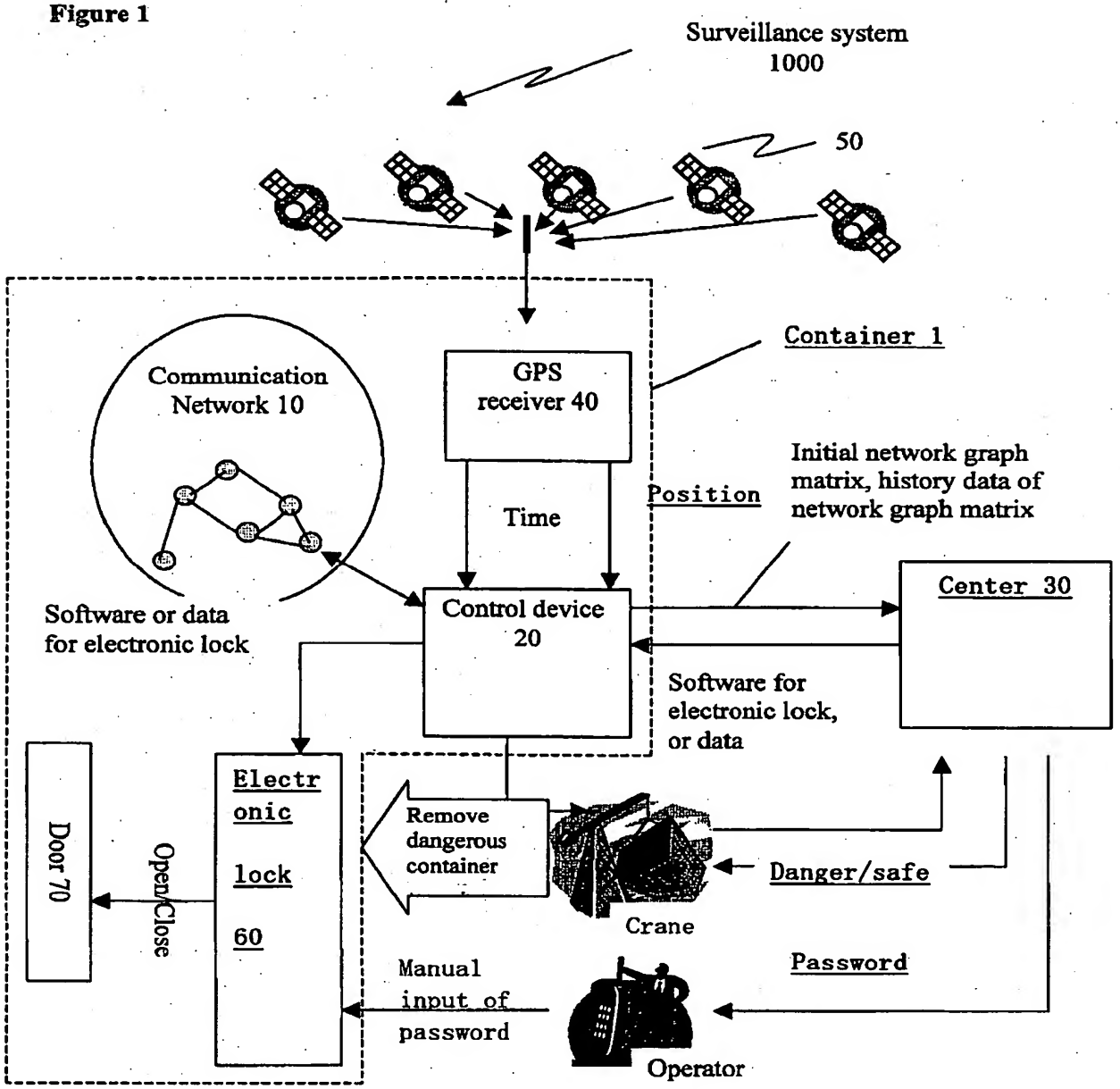

Surveillance system
1000
50
Container 1
Communication
Network 10
GPS
receiver 40
Position
Time
Initial network graph
matrix, history data of
network graph matrix
Software or data
for electronic lock
Control device
20
Center 30
Software for
electronic lock,
or data
Electr
onic
lock
60
Door 70
Open/Close
Remove
dangerous
container
Crane
Danger/safe
Password
Manual
input of
password
Operator

Figure 2 (A)

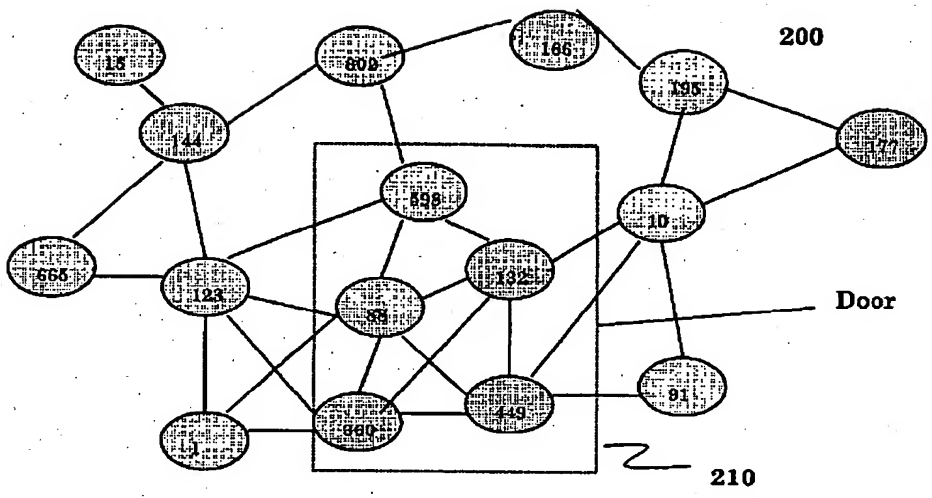


Figure 2 (B)

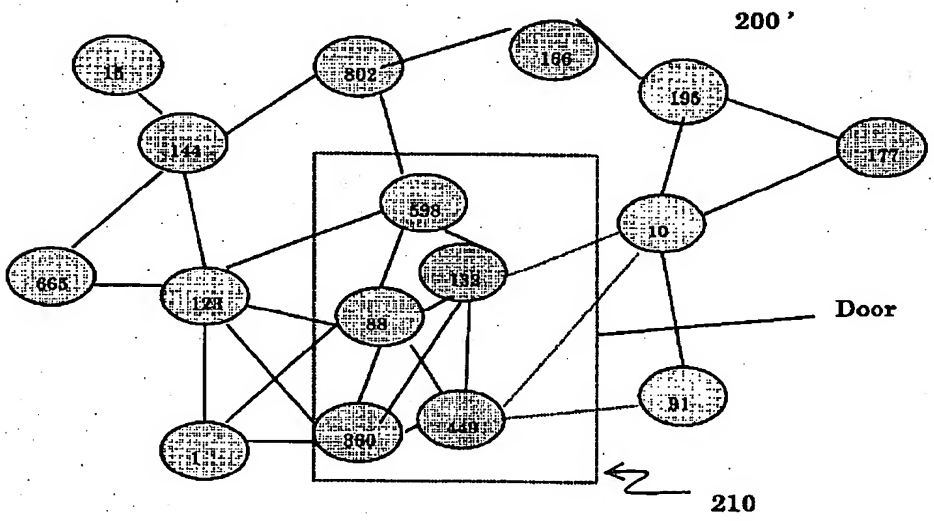


Figure 3(A)

Network graph matrix corresponding to the network graph shown in Figure 2(A)
If there is a link, indicated by 1, if no, indicated by 0
The first row and column indicate the number of communication node

300

	15	665	144	123	1	802	598	88	360	166	132	449	195	10	91	177
15	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
665	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0
144	1	1	0	1	0	1	0	0	0	0	0	0	0	0	0	0
123	0	1	1	0	1	0	1	1	1	0	0	0	0	0	0	0
1	0	0	0	1	0	0	0	1	1	0	0	0	0	0	0	0
802	0	0	1	0	0	0	1	0	0	1	0	0	0	0	0	0
598	0	0	0	1	0	1	0	1	0	0	1	0	0	0	0	0
88	0	0	0	1	1	0	1	0	1	0	1	1	0	0	0	0
360	0	0	0	1	1	0	1	0	0	0	1	1	0	0	0	0
166	0	0	0	0	0	1	0	0	0	0	0	0	1	0	0	0
132	0	0	0	0	0	0	1	1	1	0	0	1	0	1	0	0
449	0	0	0	0	0	0	0	1	1	0	1	0	0	1	1	0
195	0	0	0	0	0	0	0	0	0	1	0	0	0	1	0	1
10	0	0	0	0	0	0	0	0	0	0	1	1	1	0	1	1
91	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0
177	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0

Figure 3(B)

Network graph matrix corresponding to the network graph shown in Figure 2(B)

300'

	15	665	144	123	1	802	598	88	360	166	132	449	195	10	91	177
15	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
665	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0
144	1	1	0	1	0	1	0	0	0	0	0	0	0	0	0	0
123	0	1	1	0	1	0	1	1	1	0	0	0	0	0	0	0
1	0	0	0	1	0	0	0	1	1	0	0	0	0	0	0	0
802	0	0	1	0	0	0	1	0	0	1	0	0	0	0	0	0
598	0	0	0	1	0	1	0	1	0	0	1	0	0	0	0	0
88	0	0	0	1	1	0	1	0	1	0	1	1	0	0	0	0
360	0	0	0	1	1	0	1	0	0	0	1	1	0	0	0	0
166	0	0	0	0	0	1	0	0	0	0	0	0	1	0	0	0
132	0	0	0	0	0	0	1	1	1	0	0	1	0	0	0	0
449	0	0	0	0	0	0	0	1	1	0	1	0	0	0	0	0
195	0	0	0	0	0	0	0	0	0	1	0	0	0	1	0	1
10	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	1
91	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0
177	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0

Figure 4

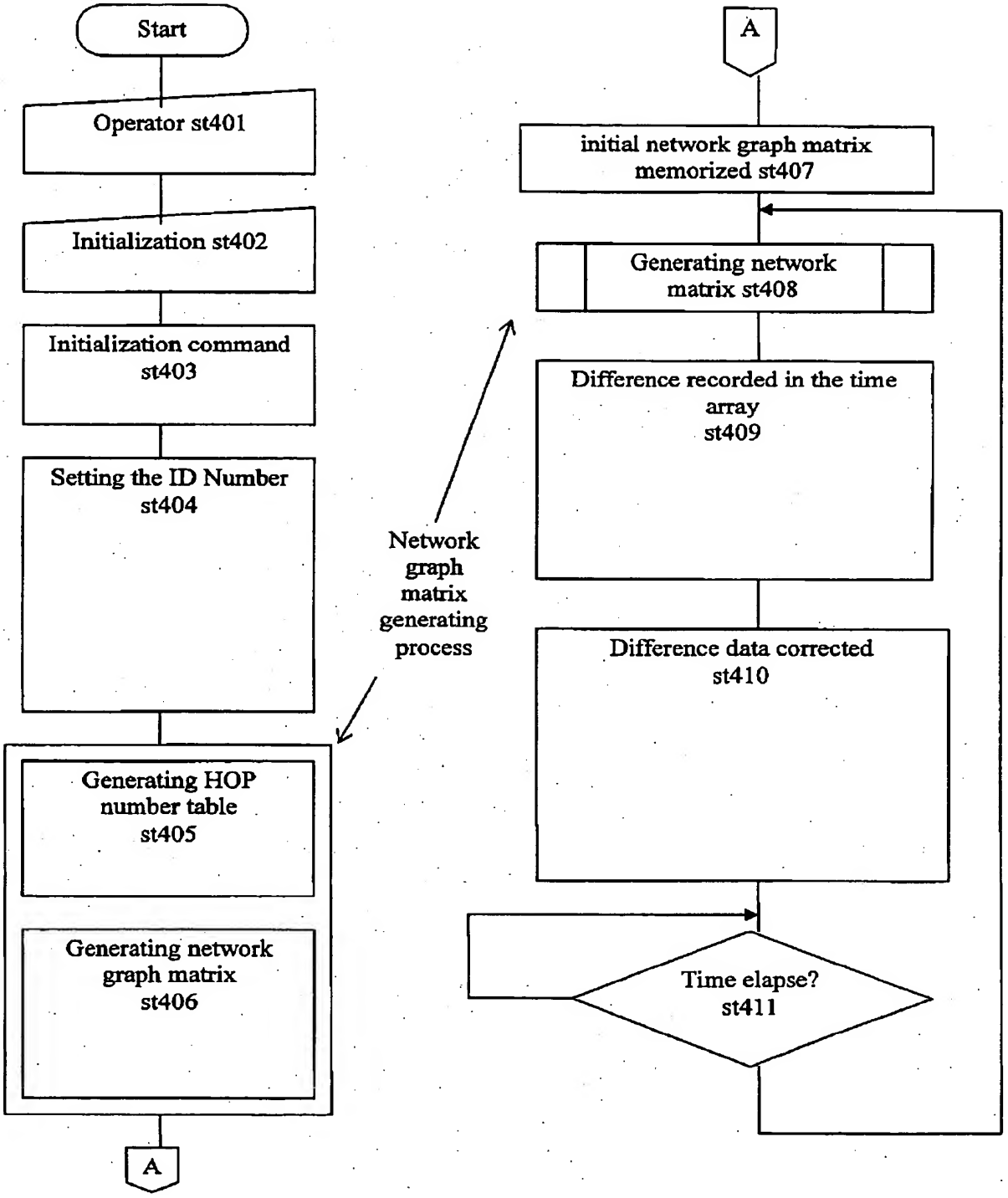

Start
Operator st401
Initialization st402
Initialization command st403
Setting the ID Number st404
Generating HOP number table st405
Generating network graph matrix st406
A
Network graph matrix generating process
A
initial network graph matrix memorized st407
Generating network matrix st408
Difference recorded in the time array st409
Difference data corrected st410
Time elapse? st411

Figure 5

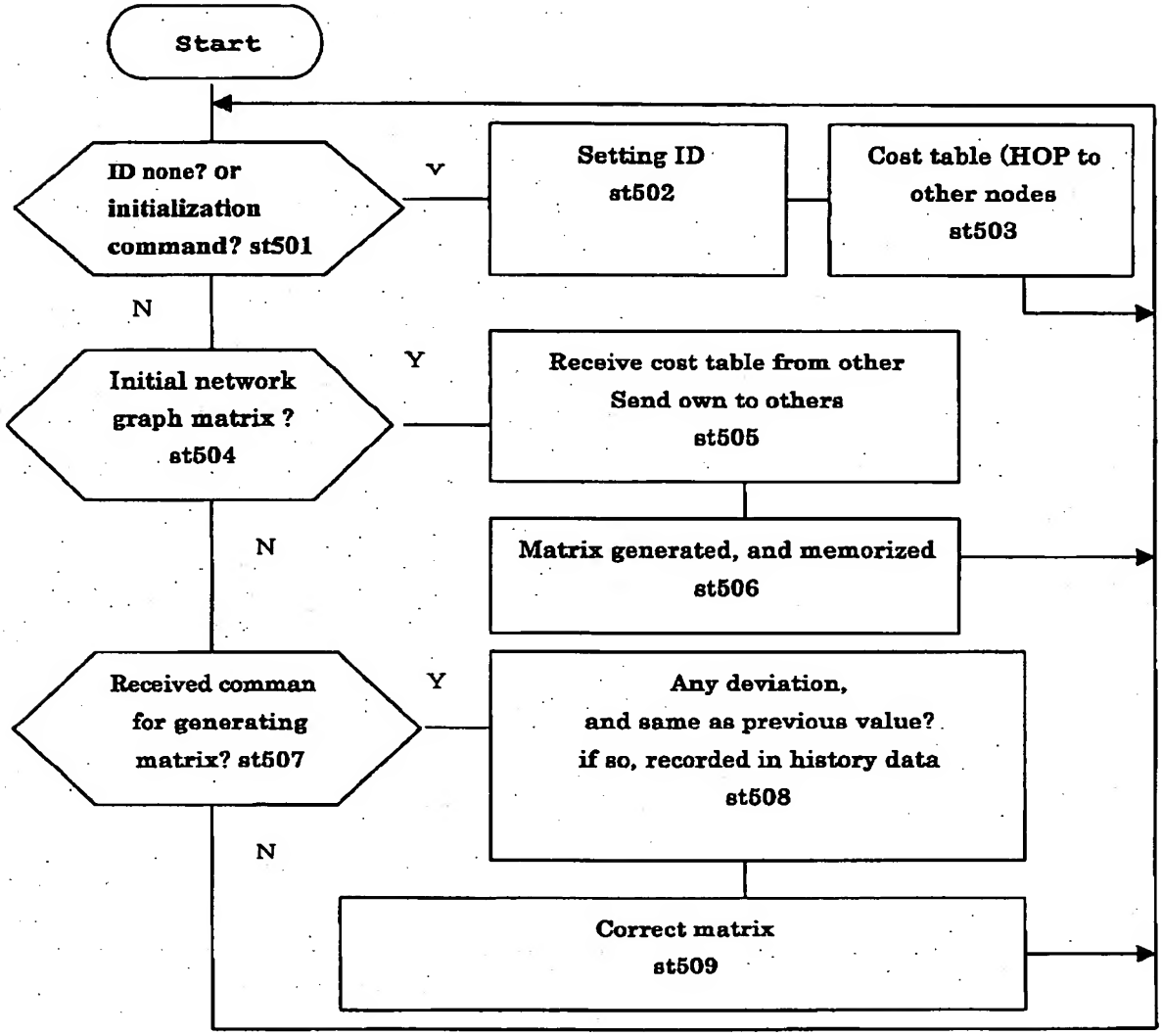

Start
ID none? or initialization command? st501
Y
Setting ID st502
Cost table (HOP to other nodes st503
N
Initial network graph matrix ? st504
Y
Receive cost table from other Send own to others st505
N
Matrix generated, and memorized st506
Received comman for generating matrix? st507
Y
Any deviation, and same as previous value? if so, recorded in history data st508
N
Correct matrix st509

Figure 6

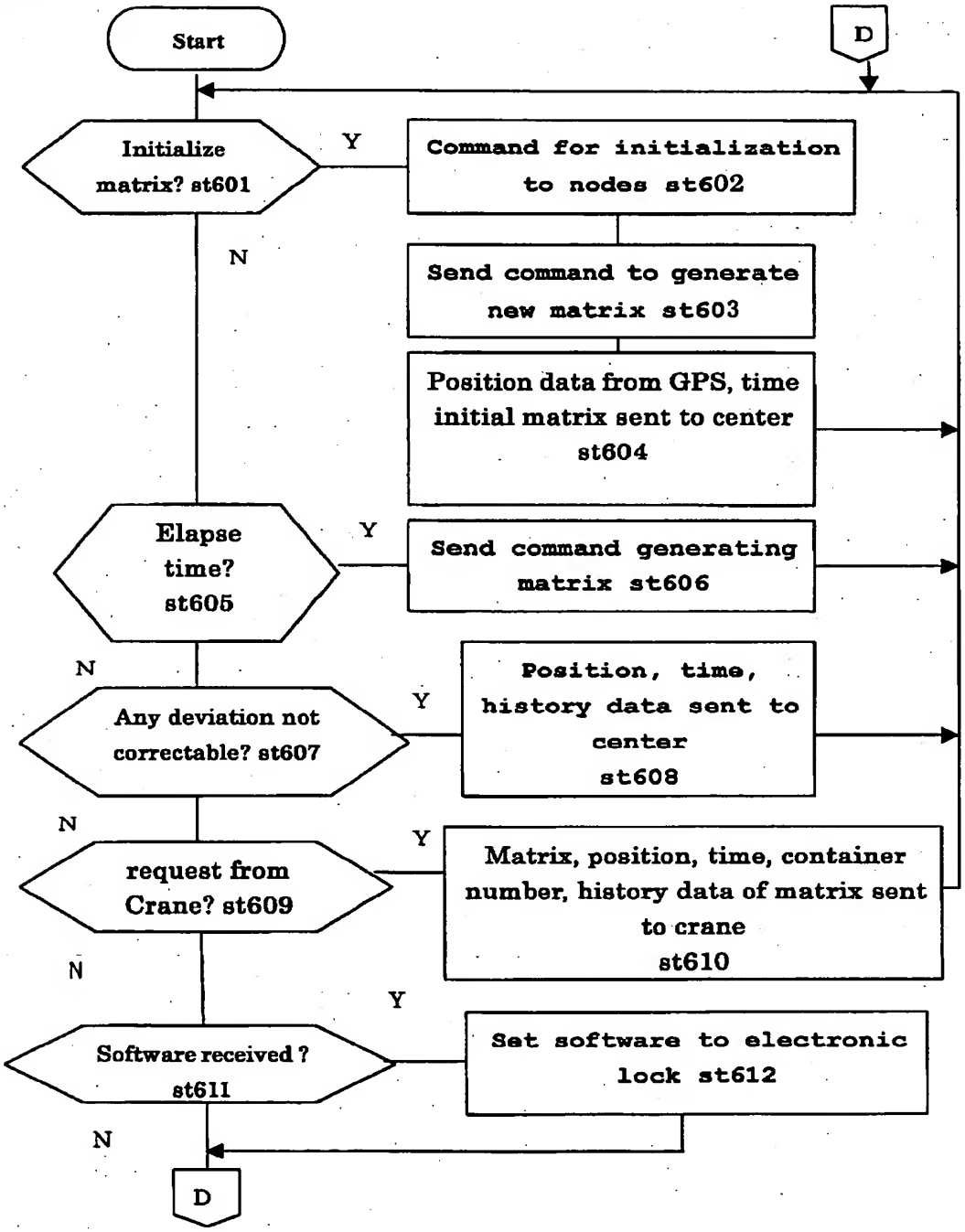

Start
D
Initialize matrix? st601
Y
Command for initialization to nodes st602
N
Send command to generate new matrix st603
Position data from GPS, time initial matrix sent to center st604
Elapse time? st605
Y
Send command generating matrix st606
N
Any deviation not correctable? st607
Y
Position, time, history data sent to center st608
N
request from Crane? st609
Y
Matrix, position, time, container number, history data of matrix sent to crane st610
N
Y
Software received ? st611
Set software to electronic lock st612
N
D

Figure 7

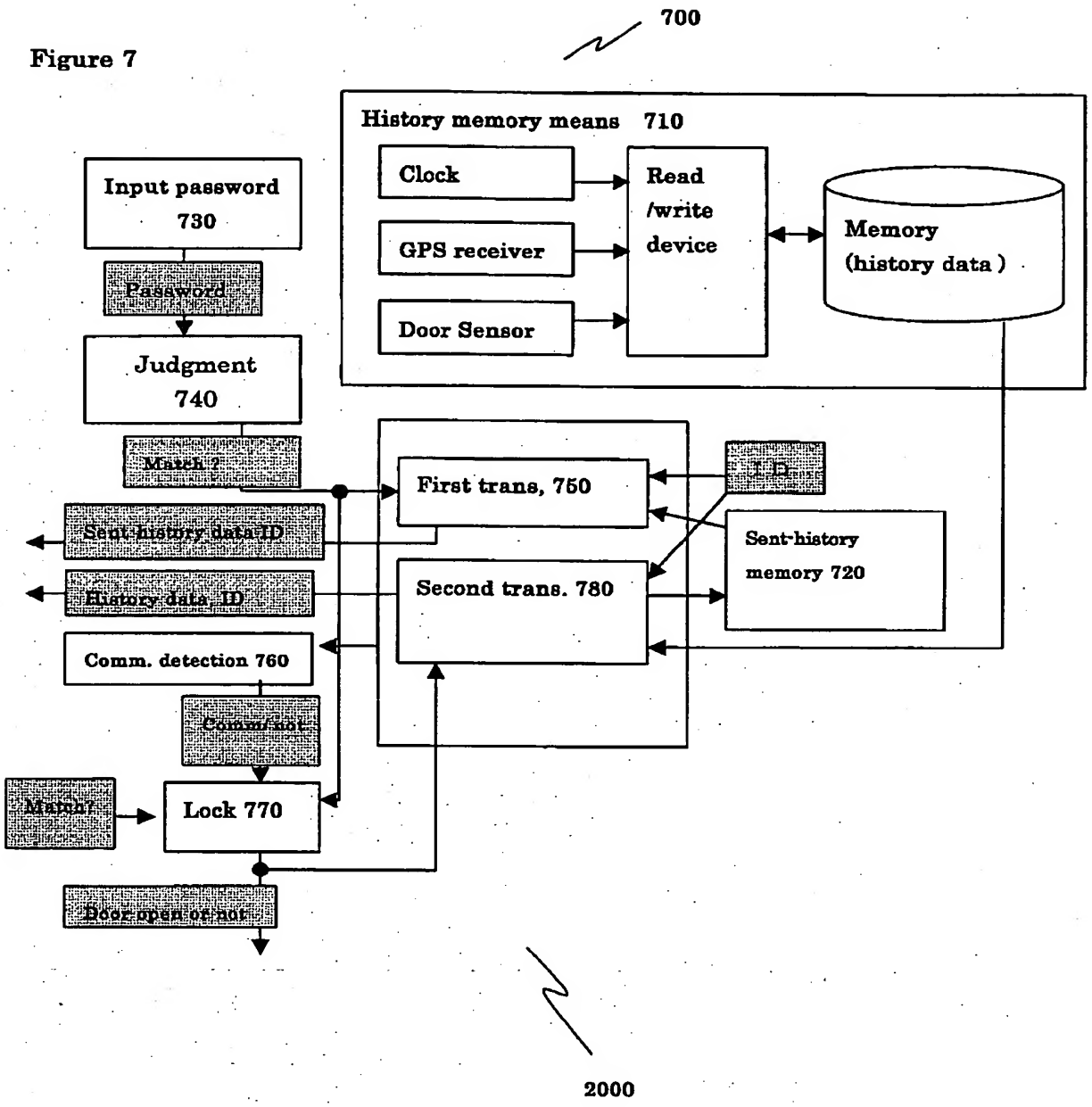
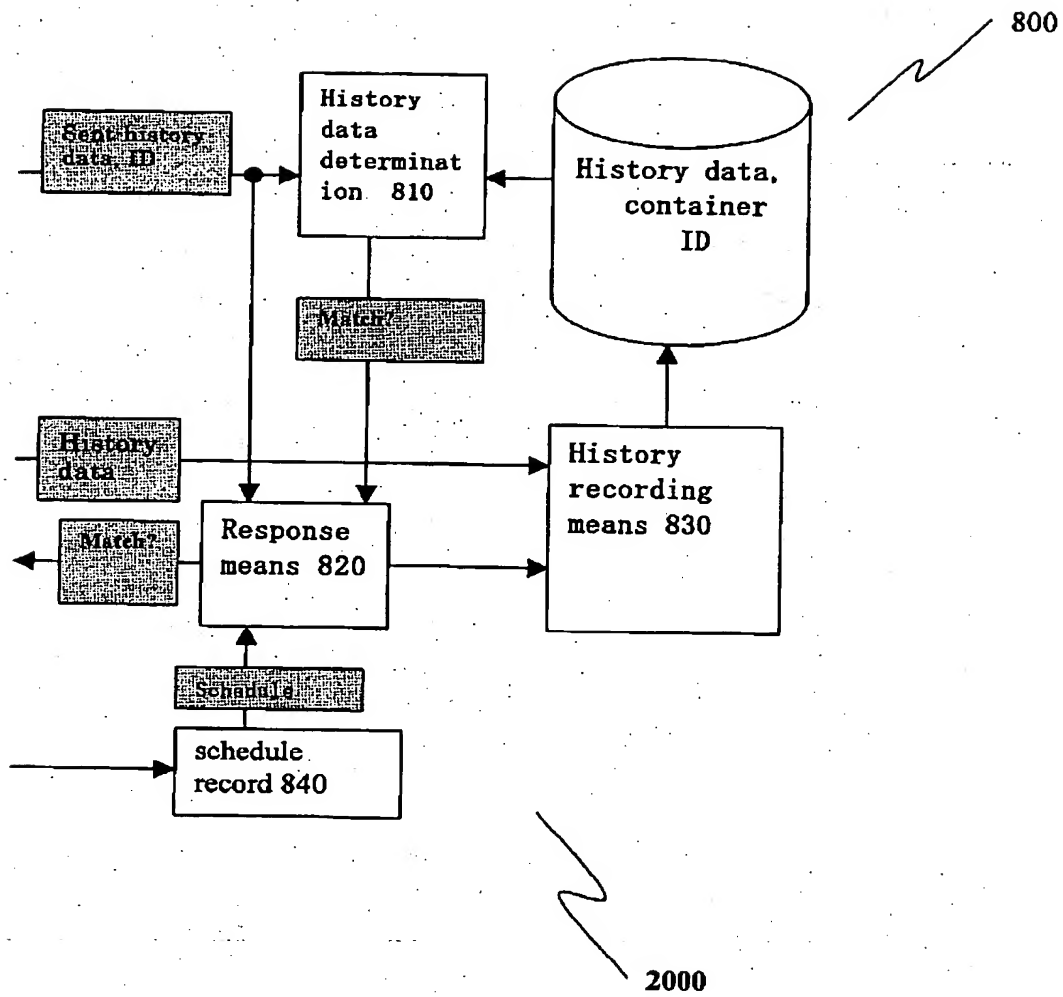

700
History memory means 710
Clock
GPS receiver
Door Sensor
Read /write device
Memory (history data)
Input password 730
Password
Judgment 740
Match ?
First trans, 750
Sent-history memory 720
Second trans. 780
Sent-history data ID
History data ID
Comm. detection 760
Match?
Lock 770
Door open or not
2000

Figure 8


800
Sent history data ID
History data determination 810
History data, container ID
Match?
History data
History recording means 830
Match?
Response means 820
Schedule
schedule record 840
2000